

Claims

[c1] What is claimed is:

1.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer, comprising at least the steps of:forming an LED stack over a first substrate;forming a first reaction layer over said LED stack;forming a reflective layer over a second substrate;forming a second reaction layer over said reflective layer; and holding together said first reaction layer and said second reaction layer by means of a transparent adhesive layer.

[c2] 2.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 1, wherein said reflective layer is a reflective metal layer.

[c3] 3.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 2, wherein said reflective metal layer comprises at least a material selected from the group consisting of In, Sn, Al, Au, Pt, Zn, Ag, Ti, Pb, Pd, Ge, Cu, AuBe, AuGe, Ni, PbSn, AuZn, and the like.

- [c4] 4.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 1, wherein said reflective layer is a reflective oxide layer.
- [c5] 5.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 4, wherein said reflective oxide layer comprises at least a material selected from the group consisting of SiN_x , SiO_2 , Al_2O_3 , TiO_2 , MgO , and the like.
- [c6] 6.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 1, wherein said transparent adhesive layer comprises at least a material selected from the group consisting of polyimide (PI), benzocyclobutene (BCB), perfluorocyclobutane (PFCB), and the like.
- [c7] 7.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 1, wherein said first reaction layer or said second reaction layer comprises at least a material selected from the group consisting of SiN_x , Ti, Cr, and the like.
- [c8] 8.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 1, wherein forming a reflective layer over a sec-

ond substrate comprises the steps of forming a semi-conductor stack over said second substrate and forming a reflective layer over said semiconductor stack.

- [c9] 9.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 1, further comprising the step of removing said first substrate.
- [c10] 10.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer, comprising at least the steps of:forming an LED stack over a first substrate;forming a first reaction layer over said LED stack;forming a second reaction layer over areflective metal substrate; and holding together said first reaction layer and said second reaction layer by means of a transparent adhesive layer.
- [c11] 11.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 10, wherein said reflective metal substrate comprises at least a material selected from the group consisting of Sn, Al, Au, Pt, Zn, Ag, Ti, Pb, Pd, Ge, Cu, AuBe, AuGe, Ni, PbSn, AuZn, and the like.
- [c12] 12.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according

to claim 10, wherein said transparent adhesive layer comprises at least a material selected from the group consisting of polyimide (PI), benzocyclobutene (BCB), perfluorocyclobutane (PFCB), and the like.

[c13] 13.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 10, wherein said first reaction layer or said second reaction layer comprises at least a material selected from the group consisting of SiNx, Ti, Cr, and the like.

[c14] 14.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 10, wherein the step of forming a second reaction layer over a reflective metal substrate comprises the steps of forming a reflective layer over said reflective metal substrate and forming a second reaction layer over said reflective layer.

[c15] 15.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 10, further comprising the step of removing said first substrate.

[c16] 16.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer, comprising at least the steps of: forming an LED stack over a first

substrate;forming a reflective layer over said LED stack;forming a first reaction layer over said reflective layer;forming a second reaction layer over a second substrate; and holding together said first reaction layer and said second reaction layer by means of an adhesive layer.

- [c17] 17.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 16, wherein said reflective layer is a reflective metal layer.
- [c18] 18.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 16, wherein said reflective layer is a reflective oxide layer.
- [c19] 19.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 17, wherein said reflective metal layer comprises at least a material selected from the group consisting of In, Sn, Al, Au, Pt, Zn, Ag, Ti, Pb, Pd, Ge, Cu, AuBe, AuGe, Ni, PbSn, AuZn, and the like.
- [c20] 20.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 18, wherein said reflective oxide layer comprises at least a material selected from the group consisting of

SiNx, SiO₂, Al₂O₃, TiO₂, MgO, and the like.

- [c21] 21.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 16, wherein said first reaction layer or said second reaction layer comprises at least a material selected from the group consisting of SiNx, Ti, Cr, and the like.
- [c22] 22.A method for manufacturing a light emitting diode having an adhesive layer and a reflective layer according to claim 16, further comprising the step of removing said first substrate.
- [c23] 23.A light emitting diode having an adhesive layer and a reflective layer, comprising at least:
a substrate;
a reflective layer formed over the substrate;
a first reaction layer formed over said reflective layer;
a transparent adhesive layer formed over said first reaction layer;
a second reaction layer formed over said transparent adhesive layer;
and an LED stack formed over said second reaction layer.
- [c24] 24.A light emitting diode having an adhesive layer and a reflective layer according to claim 23, further comprising a transparent conductive layer between said second reaction layer and said LED stack.
- [c25] 25.A light emitting diode having an adhesive layer and a reflective layer according to claim 23, wherein said re-

flective layer is a reflective metal layer.

- [c26] 26.A light emitting diode having an adhesive layer and a reflective layer according to claim 23, wherein said reflective layer is a reflective oxide layer.
- [c27] 27.A light emitting diode having an adhesive layer and a reflective layer according to claim 25, wherein said reflective metal layer comprises at least a material selected from the group consisting of In, Sn, Al, Au, Pt, Zn, Ag, Ti, Pb, Pd, Ge, Cu, AuBe, AuGe, Ni, PbSn, AuZn, and the like.
- [c28] 28.A light emitting diode having an adhesive layer and a reflective layer according to claim 26, wherein said reflective oxide layer comprises at least a material selected from the group consisting of SiNx, SiO₂, Al₂O₃, TiO₂, MgO, and the like.
- [c29] 29.A light emitting diode having an adhesive layer and a reflective layer according to claim 23, wherein said transparent adhesive layer comprises at least a material selected from the group consisting of polyimide (PI), benzocyclobutene (BCB), perfluorocyclobutane (PFCB), and the like.
- [c30] 30.A light emitting diode having an adhesive layer and a reflective layer according to claim 23, wherein said first reaction layer or said second reaction layer comprises at

least a material selected from the group consisting of SiNx, Ti, Cr, and the like.

- [c31] 31. A light emitting diode having an adhesive layer and a reflective layer, comprising at least:
a substrate;
a first reaction layer formed over the substrate;
an adhesive layer formed over said first reaction layer;
a second reaction layer formed over said adhesive layer;
a reflective layer formed over said second reaction layer; and
an LED stack formed over said reflective layer.
- [c32] 32. A light emitting diode having an adhesive layer and a reflective layer according to claim 31, further comprising a transparent conductive layer between said reflective layer and said LED stack.
- [c33] 33. A light emitting diode having an adhesive layer and a reflective layer according to claim 31, wherein said reflective layer is a reflective metal layer.
- [c34] 34. A light emitting diode having an adhesive layer and a reflective layer according to claim 31, wherein said reflective layer is a reflective oxide layer.
- [c35] 35. A light emitting diode having an adhesive layer and a reflective layer according to claim 33, wherein said reflective metal layer comprises at least a material selected from the group consisting of In, Sn, Al, Au, Pt, Zn, Ag, Ti,

Pb, Pd, Ge, Cu, AuBe, AuGe, Ni, PbSn, AuZn, and the like.

- [c36] 36.A light emitting diode having an adhesive layer and a reflective layer according to claim 34, wherein said reflective oxide layer comprises at least a material selected from the group consisting of SiNx, SiO₂, Al₂O₃, TiO₂, MgO, and the like.
- [c37] 37.A light emitting diode having an adhesive layer and a reflective layer according to claim 31, wherein said transparent adhesive layer comprises at least a material selected from the group consisting of polyimide (PI), benzocyclobutene (BCB), perfluorocyclobutane (PFCB), and the like.
- [c38] 38.A light emitting diode having an adhesive layer and a reflective layer according to claim 31, wherein said first reaction layer or said second reaction layer comprises at least a material selected from the group consisting of SiNx, Ti, Cr, and the like.
- [c39] 39.A light emitting diode having an adhesive layer and a reflective layer, comprising at least:
a reflective metal substrate;
a first reaction layer formed over the reflective metal substrate;
a transparent adhesive layer formed over said first reaction layer;
a second reaction layer formed over said transparent adhesive layer; and
an LED stack

formed over said second reaction layer.

- [c40] 40. A light emitting diode having an adhesive layer and a reflective layer according to claim 39, further comprising a transparent conductive layer between said second reaction layer and said LED stack.
- [c41] 41. A light emitting diode having an adhesive layer and a reflective layer according to claim 39, wherein said reflective metal substrate comprises at least a material selected from the group consisting of Sn, Al, Au, Pt, Zn, Ag, Ti, Pb, Pd, Ge, Cu, AuBe, AuGe, Ni, PbSn, AuZn, and the like.
- [c42] 42. A light emitting diode having an adhesive layer and a reflective layer according to claim 39, wherein said transparent adhesive layer comprises at least a material selected from the group consisting of polyimide (PI), benzocyclobutene (BCB), perfluorocyclobutane (PFCB), and the like.
- [c43] 43. A light emitting diode having an adhesive layer and a reflective layer according to claim 39, wherein said first reaction layer or said second reaction layer comprises at least a material selected from the group consisting of SiNx, Ti, Cr, and the like.